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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/673,857	09/29/2003	Bjorn de Sutter	YOR920030361US1	3717
23334 7590 04/19/2007 FLEIT, KAIN, GIBBONS, GUTMAN, BONGINI & BIANCO P.L. ONE BOCA COMMERCE CENTER 551 NORTHWEST 77TH STREET, SUITE 111 BOCA RATON, FL 33487			EXAMINER WEI, ZHENG	
			ART UNIT 2192	PAPER NUMBER

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/19/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/673,857

Applicant(s)

SUTTER ET AL.

Examiner

Zheng Wei

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>09/29/2003</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to the application filed on 09/29/2003.
2. Claims 1-31 are pending and have been examined.

Oath/Declaration

3. The Office acknowledges receipt of a properly signed oath/declaration filed on September 29, 2003.

Priority

4. The priority date considered for this application is September 29, 2003.

Information Disclosure Statement

5. The information disclosure statements filed 09/29/2003 has been placed in the application file and the information referred to therein has been considered.

Drawings

6. The drawings filed on September 29, 2003 are objected to because of following informalities:

Fig.4, line 7, "T' is equal to T, or T is a subtype of T" should be -T' is equal to T, or T' is a subtype of T -

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended

replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

7. Claims 10, 11, 15, 25, 26 and 30 are objected to because of the following informalities:

Claims 10, 11, 25 and 26: The term "point-to sets analysis" should be – points-to sets analysis --. (see for example, p.14, paragraph [0068])

Claims 15 and 30: "removing S.sub.E is removed any type" should be –removing S.sub.E form any type –

Claim 13 and 28: "customizable container C" should be -- customizable container class C --

Appropriate correction is required.

Claim Rejections - 35 USC § 101

8. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

9. Claims 16-30 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claim 16:

Claim 16 recites "A computer readable medium containing programming instruction..." as the claimed subject matter. The specification further defines the "computer readable medium" that could be any type of "network link" and/or "wireless network", which the applicant has indicated as being included in the scope of "a computer readable medium" (see for example, p.37, paragraph [0210], "computer readable information in a transitory state medium such as a network link and/or a network interface, including a wired network or a wireless network..."). Because this "computer readable medium" can be interpreted as a signal encoded with functional descriptive material, which does not fall within any of the categories of patentable subject matter set forth in 35 U.S.C § 101.

For further information, see Interim Guidelines for Examination of Patent Application for Patent Subject Matter Eligibility (signed 26Oct2005) –OG Cite: 1300 OG 142.
<<http://www.uspto.gov/web/offices/com/sol/og/2005/week47/patgupa.htm>>

Claims 17-30:

Claims 17-30 are dependent claims of claim 16. These claims all fail to remedy the 35 U.S.C 101 nonstatutory problems of claim 16. Therefore, they are also rejected for the same reason.

--These rejections can be overcome by defining the computer readable medium as a computer readable storage medium.

Claim Rejections - 35 USC § 112

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
11. Claims 14, 15, 29 and 30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
 - The term "S.sub.D" in claims 15 and 30 is relative term which renders the claims indefinite. The term " S.sub.D" is not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the

scope of the invention. For the purpose of compact prosecution, the Examiner treats the "S.sub.D" as – a set of types of instance D –

- Claims 13-15 and 28-30: Claims 13 and 28 claim "class C" and "customizable container class C". It is not clear what "C" refers to.
- Claims 14, 15 and 29, 30: Claims 14 and 29 recite the limitation "the auxiliary types" in page 41, claim 14, lines 11-12 and page 45, claim 29, lines 11-12. There are insufficient antecedent basis for this limitation in the claim. Claims 15 and 30 are dependent claims of claims 14 and 29, therefore they are also rejected for the same reason.
- Claims 14, 15, 29 and 30: Claims 14 and 29 claim "equivalence class E" at pages 41 and 45, claims 14 and 29, line 7, but also claim "E = new C" which E is an instance of class C at line 9. Therefore, it is not clear what the "E" stands for. For the purpose of compact prosecution, the Examiner treats the "E" as an instance of class C. Claims 15 and 30 are dependent claims of claims 14 and 29, thus they are also rejected for the same reason.
- Claims 13-15 and 28-30: The term "type" in claims 15 and 30 is relative term which renders the claims indefinite. The term "type" is not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. For the purpose of compact prosecution, the Examiner treats the "type" as – a collection of methods of said class --

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. Claims 1-3, 5-7 and 9-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Tip (Tip et al., Class Hierarchy Specialization)

Claim 1:

Tip discloses a method on an information processing system for automatic replacement of object classes, comprising:

- performing static analysis on a program containing a plurality of objects in order to determine constraints on the transformations that can be applied and to detect unused functionality in one or more of the objects to be replaced (see for example, p.271, section 1, Introduction, lines 7-8, "We present an algorithm that specializes a class hierarchy with respect to its usage in a program P");
- analyzing the plurality of objects to detect usage patterns of functionality in the one or more objects replaced (see for example, p.271, section 1,

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Introduction, line 9, "analyzes the member access patterns for the variables in P"); and

- generating customized classes based upon the static analysis and the usage patterns detected (see for example, p.271, section 1, Introduction, line 10, "creates distinct classes for variables that access different member").

Claim 2:

Tip further discloses the method according to claim 1, wherein the performing static analysis on a program containing a plurality of objects in order to determine constraints includes determining constraints which are type constraints (see for example, p.272, section 1.3 Overview of algorithm, second paragraph "Phase II is concerned with the computation of type constraints that precisely capture the required subtype-relationships between the types of variables, and the visibility relation between class members and variables..."; also see section 3, Phase II: Computing Type Constraints).

Claim 3:

Tip also discloses the method according to claim 1, wherein the plurality of objects is a plurality of container objects (see for example, p.275, Figure 3(a), example class hierarchy graph and related text).

Claim 5:

Tip also discloses the method according to claim 1, further comprising

- rewriting bytecode of an application to use the generated classes while providing transparency in the program's observable behavior during the replacement of the objects (see for example, p.281, section 5, Phase IV: Simplification. Lines 1-5, "which may result in a reduction in the number of compiler generated fields in objects")

Claim 6:

Tip discloses the method according to claim 1, wherein the performing static analysis further comprises:

- performing static analysis to determine constraints by determining if the type of one or more objects to be replaced is a supertype of a type referenced in a cast expression (see for example, section 3 Phase II: Computing Type Constraints; also see p.275, last paragraph, "Typecasts can be modeled as follows...".)

Claim 7:

Tip discloses the method according to claim 1, wherein the performing static analysis further comprises performing static analysis to determine type-correctness constraints by determining if the type of one or more objects to be replaced is a supertype of a type referenced in a cast expression (see for example, p.275-276, section 3.1, section 3.2 Declarations vs. definitions of

members, third paragraph and section 3.4 Type constraints due to assignments about type-correct”).

Claim 9:

Tip discloses the method according to claim 1, wherein the performing static analysis further comprises performing static analysis to preserve run-time behavior for casts and *instanceof* operations for one or more of the objects to be replaced (see for example, p.278, right column, last paragraph, “that is need to preserve the behavior of type-cast and member lookup in P”).

Claim 10:

Tip discloses the method according to claim 1, wherein the performing static analysis includes using point-to sets analysis to determine where references to classes in allocation sites, declarations, casts and *instanceof*-expressions are modifiable to refer to one or more of the objects to be replaced (see for example, p.274, section 2.3 Points-to analysis).

Claim 11:

Tip discloses the method according to claim 1, wherein the performing static analysis includes using point-to sets analysis to determine where references to container classes in allocation sites, declarations, casts and *instanceof*-expressions are modifiable to refer to one or more of the objects to be replaced

(see for example, p.274, section 2.3 Points-to analysis).

Claim 12:

Tip discloses the method according to claim 1, wherein the generating customized classes does not require a programmer to supply any additional types and additional external declarations for the customized classes (see for example, p.281 section 5, Phase IV: Simplification, "transformation rules").

Claim 13:

Tip discloses the method according to claim 1, where the generating customized classes based upon the usage patterns detected includes:

- creating a class *CustomC* which contains methods and fields that are identical to those in class C for each customizable container C with superclass B, wherein if B is not customizable, then *CustomC*'s superclass is B, otherwise *CustomC*'s superclass is *CustomB* (see for example, p.281, section 4.1 classes of the specialized hierarchy, definition 4.1 New Classes and related text);
- introducing a type *C_T* for each customizable container C, and both C and *CustomC* are made a subtype of *C_T* wherein type *C_T* contains declarations of all methods in C that are not declared in any superclass of C (see for example, p.279, section 4.3 The specialized class hierarchy, "Class T.sub.decl" and related text); and

- introducing a type C^\perp . is introduced for each customizable container C , and C^\perp is made a subclass of both C and $CustomC$, wherein type C^\perp contains no methods, wherein C_T and C^\perp are intermediate types not provided as output during the generation of custom classes (see for example, p.279, section 4.3 The specialized class hierarchy, "Class T.sub.var(x)" and related text)

Claim 14:

Tip further discloses the method according to claim 13, wherein the generation customized classes based upon the usage patterns detected includes:

- determining equivalence classes of declaration elements and expressions that must have the same type (see for example, p.281, left column, second paragraph, "elements that occur in the same equivalence class must have the same type and related description);
- computing a set of possible types for each of the equivalence classes using an optimistic algorithm, wherein this algorithm associates a set $S_{sub.E}$ of types with each equivalence class E , which is initialized as follows:
 - associating a set $S_{sub.E}$ with an equivalence class that contains an allocation site expression $E=new C$, and initializing $S_{sub.E}$ with the types C and $CustomC$ (see for example, p.279, section 4.3 The specialized class hierarchy, "Class T.sub.decl" and related text); and
 - associating a set $S_{sub.E}$ with an equivalence class that does not contain any allocation site expressions, and initializing $S_{sub.E}$ with all types

except the auxiliary types C_{\top} and C_{\perp} , wherein C_{\top} and C_{\perp} are intermediate types not provided as output during the generation of custom classes (see for example, p.283, left column, "Rule 3" and related text).

Claim 15:

Tip discloses the method according to claim 14, further comprising:

- removing a set S.sub.D from any type that is not a subtype of a type that occurs in S.sub.E for each pair of equivalence classes D, E such that there exists a type constraint $D \leq E$ (see for example, p.283, left column, "Rule 2" and related text), and
- removing S.sub.E is removed any type that is not a supertype of a type that occurs in S.sub.E for each pair of equivalence classes D, E such that there exists a type constraint $D \leq E$ (see for example, p.283, left column, "Rule 3" and related text);

wherein the removing of S.sub.D and S.sub.E is performed repeatedly until a fixed point is reached (see for example, Fig. 6, 8-9 and related text)

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 16-18, 20-22, 24-30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tip (Tip et al., Class Hierarchy Specialization)

Claims 16-18, 20-22 and 24-30:

Claims 16-18, 20-22 and 24-20 are computer program products version of the claimed method, wherein all claimed limitation functions have been addressed in claims 1-3, 5-7 and 9-12 above respectively. It is well known in the computer art that such method steps can be implemented as computer program and can be practiced and /or stored on a computer operable media. Thus, they also would have been obvious in view of reference teachings above.

Claim 31:

Claim 31 is a system version for performing the claimed method as in claims 1 addressed above, wherein all claimed limitation functions have been addressed and/or set forth above and certainly a computer system/information procession system would need to run and/or practice such function steps disclosed by reference above. Thus, it also would have been obvious.

16. Claims 4 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tip (Tip et al., Class Hierarchy Specialization) in view of Pauw (Pauw et al., Visualizing the execution of Java Programs).

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Claim 4:

Tip discloses the method according to claim 1, wherein the analyzing the plurality of objects to detect usage patterns of functionality in the one or more objects replaced (see for example, p.271, section 1, Introduction, line 9, "analyzes the member access patterns for the variables in P"), but does not explicitly disclose instrumenting the plurality of objects. However, Pauw in the same analogous art of visualizing the execution of Java programs discloses a tool Jinsight for instrumenting Java program.(see for example, p.152, section 3: Pattern Extraction in the Reference Pattern View"). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use Pauw's tool to analyze Tip's program P to get access patterns for variables in P as suggested by Tip.

Claim 19:

Claim 19 is a computer program product version of the claimed method, wherein all claimed limitation functions have been addressed in claim 4 above. It is well known in the computer art that such method steps can be implemented as computer program and can be practiced and /or stored on a computer operable media. Thus, it also would have been obvious in view of reference teachings above.

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17. Claims 8 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tip (Tip et al., Class Hierarchy Specialization) in view of Sweeney (Sweeney et al., Extracting Library-Based Object-Oriented Applications)

Claim 8:

Tip discloses the method according to claim 1, but does not explicitly disclose wherein the performing static analysis further comprises performing static analysis to determine interface-compatibility constraints in one or more of the objects to be replaced. However, Sweeney in the same analogous art of extracting Library-Based object-oriented application, discloses dynamic analyses of class interface (see for example, p.101, third paragraph to right column first, second paragraphs). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to check interface-compatibility constraints in one or more of object to be replaced as suggested by Sweeney (p.101, third paragraph, "because the analyses upon which these optimizations are based typically need to know which classes are instantiated, and which methods are invoked").

Claim 23:

Claim 23 is a computer program product version of the claimed method, wherein all claimed limitation functions have been addressed in claim 8 above. It is well known in the computer art that such method steps can be implemented as computer program and can be practiced and /or stored on a computer operable

media. Thus, they also would have been obvious in view of reference teachings above.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
 - Snelting et al. "Understanding Class Hierarchies Using Concept Analysis (Published:2000 ACM) discloses a method for analyzing and reengineering class hierarchies.
 - Tip et al., "Practical Experience with an Application Extractor for Java" discloses a method to use program transformations to simplify the class hierarchy for reducing application size
19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zheng Wei whose telephone number is (571) 270-1059 and Fax number is (571) 270-02059. The examiner can normally be reached on Monday-Thursday 8:00-15:00.

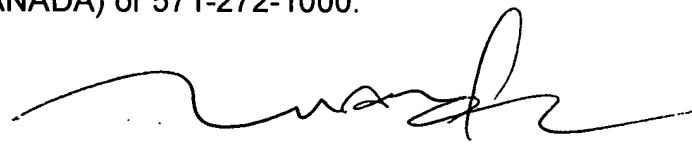
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q. Dam can be reached on (571) 272-3695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Any inquiry of a general nature of relating to the status of this application or proceeding should be directed to the TC 2100 Group receptionist whose telephone number is 571- 272-1000.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ZW



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SUPERVISORY PATENT EXAMINER